KRAMER ELECTRONICS LTD.

USER MANUAL

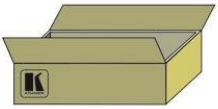
MODEL:
VS-44HN
4x4 HDMI Matrix Switcher

P/N: 2900-300161 Rev 8

VS-44HN Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box



- ☑ **VS-44HN** 4x4 HDMI Matrix Switcher
- ☑ 1 Power cord
- ☑ 1 Set of rack "ears"
- ☑ 4 Rubber feet
- ☑ 1 Quick Start Guide
- ☑ Kramer RC-IR3 Infrared Remote Control Transmitter with batteries and user manual

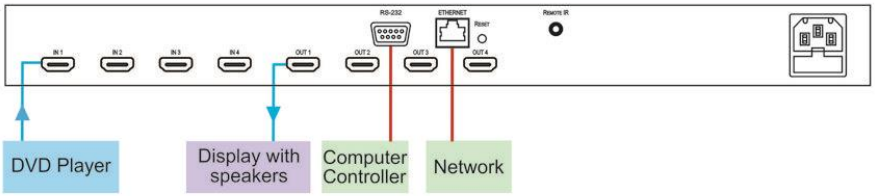
Save the original box and packaging in case your VS-44HN needs to be returned to the factory for service.

Step 2: Install the VS-44HN

Mount the machine in a rack (using the included rack "ears") or attach the rubber feet and place on a table.

Step 3: Connect the inputs and outputs

Always switch off the power on each device before connecting it to your **VS-44HN**.



Always use Kramer high-performance cables for connecting AV equipment to the **VS-44HN**.

Step 4: Connect the power

Connect the power cord to the **VS-44HN** and plug it into the mains electricity.

Step 5: Operate the VS-44HN

- ❒ Press an output button followed by an input button
- ❒ A connected output
- ❒ Several outputs

To Store:
1. Set the device to the desired setting.
2. Press the STO button. The STO button blinks.
3. Select an IN or OUT button to store the device setting.
4. Press the LOCK button to store the current setup.

To Recall:
1. Press the RCL button. The RCL button blinks.
2. Press the relevant IN or OUT button.

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Video Products.

Congratulations on purchasing your Kramer **VS-44HN** *4x4 HDMI Matrix Switcher*, which is ideal for the following typical applications:

- Conference room presentations
- Advertising applications
- Rental and staging

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual

Go to http://www.kramerelectronics.com/support/product_downloads.asp to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your **VS-44HN** away from moisture, excessive sunlight and dust

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

2.2 Safety Instructions

Caution: There are no operator serviceable parts inside the unit

Warning: Use only the power cord that is supplied with the unit

Warning: Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

3 Overview

The **VS-44HN** is a high quality 4x4 matrix switcher for HDMI signals. It reclocks and equalizes the signals and can route any input to any or all outputs simultaneously.

In particular, the **VS-44HN** features:

- Up to 6.75Gbps data rate (2.25Gbps per graphics channel)
  Suitable for resolutions up to UXGA and 1080p at 60Hz
- Support for HDCP (High Definition Digital Content Protection)
- HDMI Support – HDMI (3D, Deep Color, x.v.Color™, Lip Sync)
- 3D pass-through
- Support for up to 7.1 multi-channel audio
- I-EDIDPro™ Kramer Intelligent EDID Processing™ – Intelligent EDID handling & processing algorithm ensures Plug and Play operation for HDMI systems
- Kramer reKlocking™ and Equalization Technology that rebuilds the digital signal to travel longer distances
- A lock button to prevent unwanted tampering with the buttons on the front panel
- Preset memory locations for quick access to common configurations
- Support for Kramer Protocol 2000 and Protocol 3000

You can control the **VS-44HN** using the front panel buttons, or remotely via:

- RS-232 serial commands transmitted by a PC, touch screen system or other serial controller
- The Kramer infrared remote control transmitter
- A PC connected to the Ethernet port on the device via a LAN
- An external remote IR receiver (optional), see Section 3.2

3.1 Defining the VS-44HN 4x4 HDMI Matrix Switcher

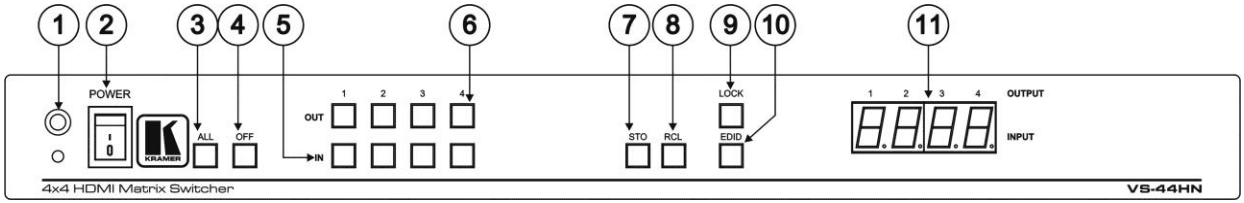


Figure 1: VS-44HN 4x4 HDMI Matrix Switcher Front Panel

#	Feature		Function
1	*IR* Receiver and Indication LED		Signal receiver for the infrared remote control transmitter. LED lights yellow when receiving an IR signal
2	*POWER* Illuminated Power Switch		Turn the device on and off
3	*ALL* Button		Press followed by an input button to connect the selected input to all outputs For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs
4	*OFF* Button		Press after pressing an output button to disconnect the selected output from the inputs. To disconnect all the outputs, press ALL followed by OFF
5	*SELECT* Buttons	*IN* (1 to 4)	Press to select the input to switch after selecting an output (also used for storing machine setups (see Section 6.3)
6		*OUT* (1 to 4)	Press to select an output to switch followed by an input (also used for storing machine setups (see Section 6.3)
7	*STO* Button		Press to store the current switching setting to a preset (see Section 6.3)
8	*RCL* Button		Press to recall the switch setting from a preset (see Section 6.3)
9	*LOCK* Button		Press and hold to toggle the locking/release of the front panel buttons. When storing or recalling presets, press to store or recall the preset (see Section 6.3)
10	*EDID* Button		Press to capture the EDID (see Section 6.1)
11	*OUTPUT/INPUT* 7-segment LED Display		Displays the input currently switched to the output which is marked above each input

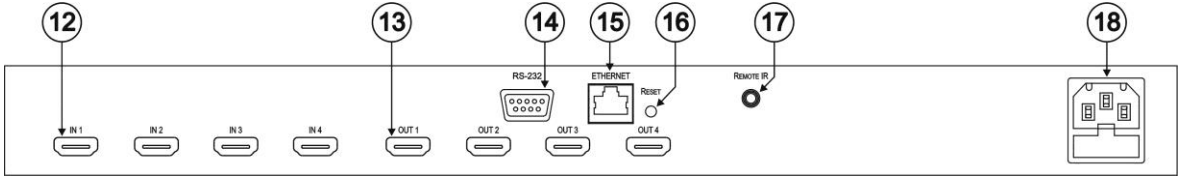


Figure 2: VS-44HN 4x4 HDMI Matrix Switcher Rear Panel

#	Feature	Function
12	*IN* HDMI Connectors (1 to 4)	Connect to up to 4 HDMI sources
13	*OUT* HDMI Connectors (1 to 4)	Connect to up to 4 HDMI acceptors
14	*RS-232* 9-pin D-sub Serial Port Connector	Connect to a PC/serial controller
15	*ETHERNET* RJ-45 Connector	Connect to a PC via a LAN
16	*RESET* Button	Press and hold while powering on the device to reset to factory default IP settings (see Section 6.5 and Section 9)
17	*REMOTE IR* Opening	Connect to an external IR receiver for controlling the device via and IR remote controller (see Section 3.2) Covered by a cap. The 3.5mm jack at the end of the internal IR connection cable fits into this opening
18	Mains Power Connector and Fuse	Plug in the power cord

3.2 Using the IR Transmitter

You can use the **RC-IR3** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver (Model: C-A35M/IRR-50). The external IR receiver can be located up to 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three extension cables (Model: C-A35M/A35F-50).

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable (for example, P/N: 505-70434010-S) with the 3.5mm connector that fits into the REMOTE IR opening on the rear panel. Connect the external IR receiver to the REMOTE IR 3.5mm connector.

4 Installing in a Rack

This section provides instructions for rack mounting the unit.

Before installing in a rack, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0º to +40ºC (32º to 104ºF)
STORAGE TEMPERATURE:	-40º to +70ºC (-40º to 158ºF)
HUMIDITY:	10% to 90%, RHL non-condensing

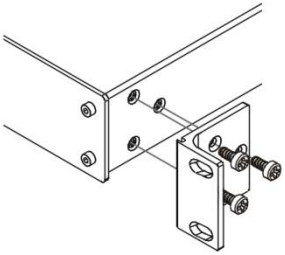
CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

5 Connecting the VS-44HN 4x4 HDMI Matrix Switcher

Always switch off the power to each device before connecting it to your **VS-44HN**. After connecting your **VS-44HN**, connect its power and then switch on the power to each device.

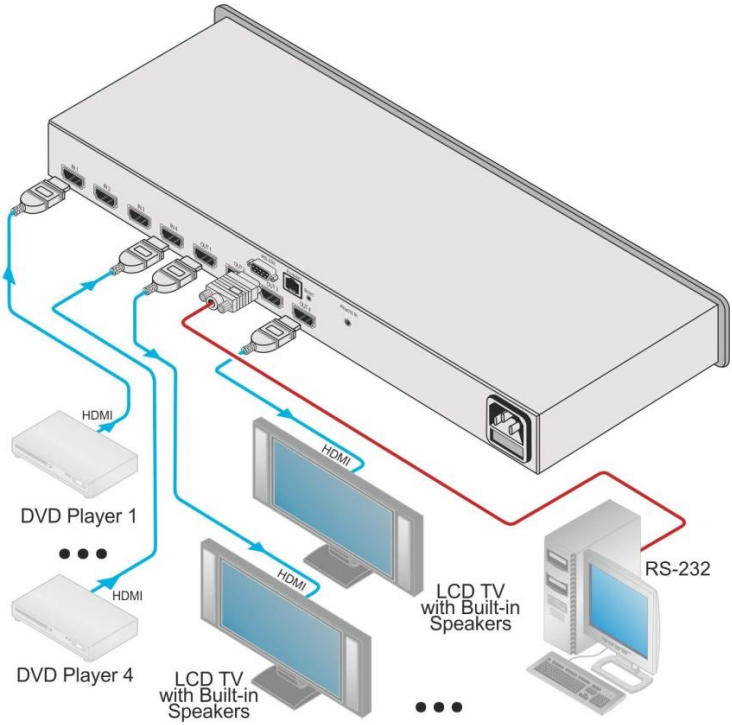


Figure 3: Connecting the VS-44HN 4x4 HDMI Matrix Switcher

To connect the VS-44HN 4x4 HDMI Matrix Switcher as illustrated in the example in Figure 3:

1. Connect up to four HDMI sources (for example, DVD players) to the IN HDMI connectors.
   You do not have to connect all the sources.

2. Connect the four OUT HDMI connectors to up to four HDMI acceptors (for example, LCD displays with built-in speakers).
   You do not have to connect all the outputs.

3. If required, connect a PC/controller to the RS-232 port (see Section 6.4) and/or the Ethernet port (see Section 7.2).

4. Connect the device to the mains electricity (not shown in Figure 3).

5. Power on the device.

6. If necessary, acquire the EDID (see Section 6.1).

6 Operating the VS-44HN 4x4 HDMI Matrix Switcher

This section describes:

- Switching an input to an output (see Section 6.1)
- Acquiring the EDID (see Section 6.2)
- Storing and recalling switch settings (see Section 6.3)
- Switching Between Protocol 2000 and Protocol 3000 (see Section 6.4)
- Resetting the **VS-44HN** (see Section 6.5)

6.1 Switching an Input to an Output

To switch an input to an output:

- Press an output button followed by an input button to switch the selected input to the selected output

6.2 Acquiring the EDID

You can acquire the EDID from any of the following:

- One output set to one or more of the four inputs (see Section 6.2.1)
- Different outputs set to different inputs (see Section 6.2.2)
- The default EDID (see Section 6.2.3)

Note: Attempting to acquire the EDID from an output that does not have a display device connected to it results in the default EDID being acquired.

6.2.1 Acquiring the EDID from One Output

Note: You can assign the EDID from one output to any or all of the four inputs.

To acquire the EDID from a display device connected to one of the outputs:

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.

2. Press the input button to which the EDID is copied.
   The selected input number flashes on the display.

3. Select the output from which the EDID is to be acquired.

4. Press the EDID button.
   The EDID is stored when the display returns to normal and the EDID and STO buttons stop flashing.

6.2.2 Acquiring the EDID from Different Outputs to Different Inputs

To acquire the EDID from several outputs (for example, OUT 1 to IN 1 and OUT 4 to IN 3):

1. Connect the display devices to the outputs from which you want to acquire the EDIDs.

2. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.

3. Press the input button to which the EDID is copied (for example, IN 1).
   The selected input number flashes on the display.

4. Select the output from which the EDID is acquired (for example, OUT 1).

5. Press the IN 1 button.
   The IN 1 button stops flashing.

6. Press the next input button to which the EDID is copied (for example, IN 3).
   The selected input number flashes on the display.

7. Select the output from which the EDID is acquired (for example, OUT 4).

8. Press the IN 3 button.
   The IN 3 button stops flashing.

9. Press the input buttons to which you want to copy the EDID (for example, IN 1 and IN 3).

10. Make sure that the relevant input numbers flash on the display.

11. Press the EDID button.
    The process is complete when the display returns to normal.

6.2.3 Acquiring the Default EDID

To store the default EDID on a selected input (for example, Input 2):

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.

2. Press the input (for example, Input 2) to which the EDID is to be copied.
   The selected input number flashes on the display.

3. Press the OFF button until "0" (zero) appears on the display.

4. Press the EDID button.
   The default EDID is stored on the selected input when the display returns to normal.

6.3 Storing and Recalling a Switching Setting from a Preset

You can use the STO and RCL buttons to store up to 8 setups and then recall them using the OUT (1-4) and IN (5-8) selector buttons (see Figure 4).

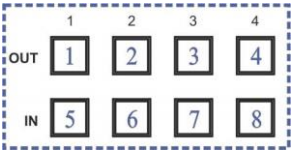


Figure 4: Store-Recall Button Configuration

To store a switching setting (for example, to preset 8):

1. Configure the switching as required for the preset.

2. Press the STO button.
   The STO button flashes.

3. Select an OUT or IN SELECT button to store the device setting (for example, IN 4 for preset 8).

4. Press the LOCK button to store the current setup.
   You have to press the LOCK button within 10 seconds or the procedure automatically times out.

To recall a switching setting (for example, from preset 3):

1. Press the RCL button.
   The RCL button flashes.

2. Press the relevant OUT or IN button that stored the preset (for example, OUT 3/preset 3).

3. Press the LOCK button to recall the stored preset.
   The RCL button stops flashing.

6.4 Switching Between Protocol 2000 and Protocol 3000

To switch from Protocol 2000 to Protocol 3000 and back again using the front panel buttons:

1. On the TO OUTPUT 1 row, press Output buttons 1 and 3 at the same time.
   Protocol 3000 is active.

2. On the TO OUTPUT 1 row, press Output buttons 1 and 2 at the same time.
   Protocol 2000 is active.

Note that when sending consecutive protocol commands make sure to maintain at least a 200ms delay between commands.

After performing EDID get/store commands, a 1 sec delay is required before sending another protocol command.

6.5 Resetting the VS-44HN 4x4 HDMI Matrix Switcher's IP Parameters

This procedure resets only the IP related parameters. All switching and preset values remain unchanged.

To reset the IP parameters to their default values (see Section 9):

- Press and hold the RESET button on the rear panel while powering up the device

7 Connecting to the VS-44HN

This section describes:

- Connecting to the **VS-44HN** via RS-232 (see Section 7.1)
- Connecting to the **VS-44HN** via Ethernet (see Section 7.2)
- Upgrading the firmware (see Section 7.3)

7.1 Connecting to the VS-44HN 4x4 HDMI Matrix Switcher via RS-232

You can connect to the **VS-44HN** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the **VS-44HN** via RS-232:

- Connect the RS-232 9-pin D-sub rear panel port on the **VS-44HN** unit via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC

7.2 Connecting to the VS-44HN 4x4 HDMI Matrix Switcher via Ethernet

You can connect to the **VS-44HN** via Ethernet using either of the following methods:

- Directly to the PC using a crossover cable (see Section 7.2.1)
- Via a network hub, switch, or router, using a straight-through cable (see Section 7.2.2)

Note: If you want to connect via a router and your IT system is based on IPv6, speak to your IT department for specific installation instructions.

After connecting the Ethernet port, you have to install and configure your Ethernet Port. For detailed instructions, see the "Ethernet Configuration (FC-11) guide.pdf" file in the technical support section at http://www.kramerelectronics.com/support/faq.asp.

7.2.1 Connecting the Ethernet Port directly to a PC

You can connect the Ethernet port of the **VS-44HN** to the Ethernet port on your PC using a crossover cable with RJ-45 connectors.

This type of connection is recommended for identifying the **VS-44HN** with the factory configured default IP address.

After connecting the **VS-44HN** to the Ethernet port, configure your PC as follows:

1. Click **Start** > **Control Panel** > **Network and Sharing Center**.

2. Click **Change Adapter Settings**.

3. Highlight the network adapter you want to use to connect to the device and click **Change settings of this connection**.
   The Local Area Connection Properties window for the selected network adapter appears as shown in Figure 5.

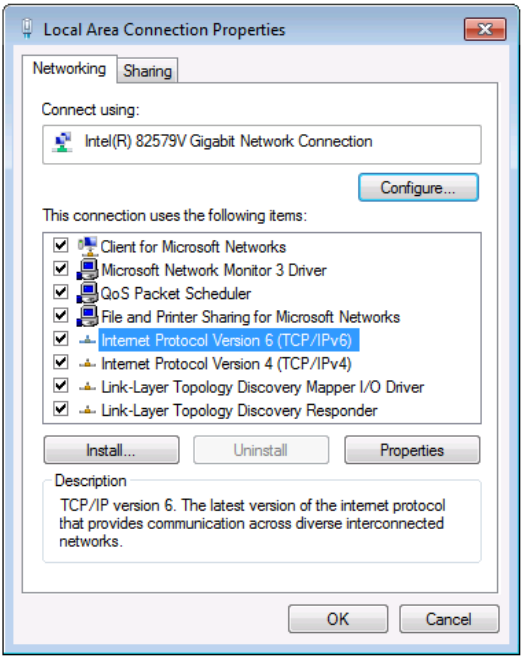


Figure 5: Local Area Connection Properties Window

4. Highlight either **Internet Protocol Version 6 (TCP/IPv6)** or **Internet Protocol Version 4 (TCP/IPv4)** depending on the requirements of your IT system.

5. Click **Properties**.

   The Internet Protocol Properties window relevant to your IT system appears as shown in Figure 6 or Figure 7.

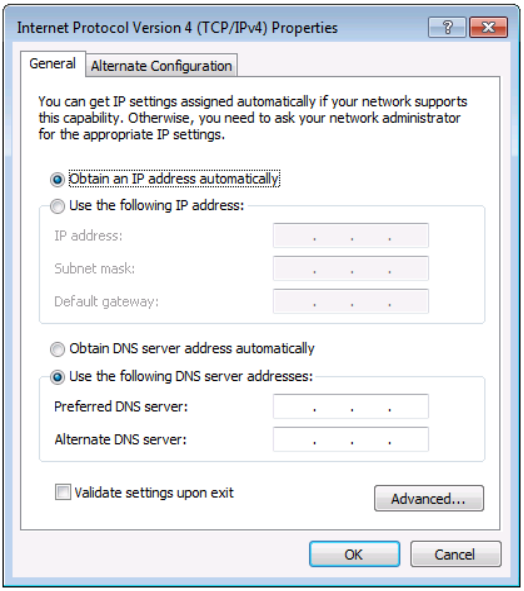

Internet Protocol Version 4 (TCP/IPv4) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

Figure 6: Internet Protocol Version 4 Properties Window

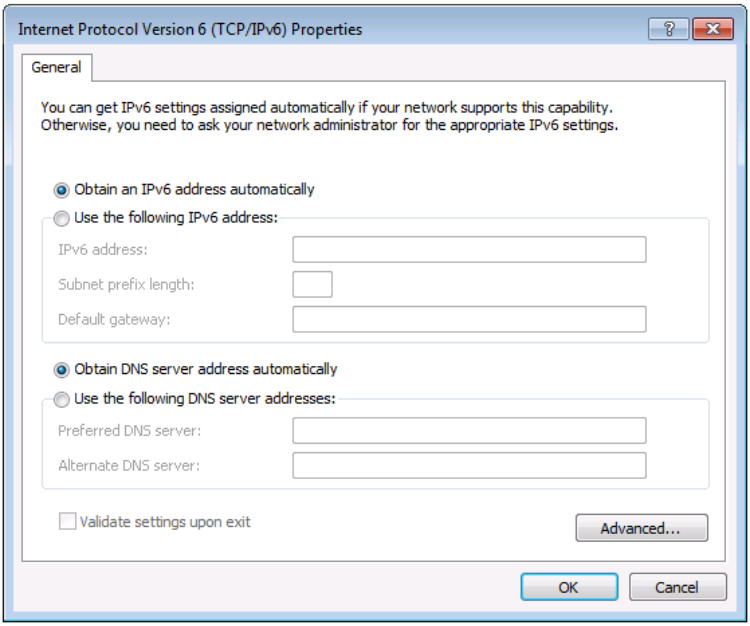

Internet Protocol Version 6 (TCP/IPv6) Properties
General
You can get IPv6 settings assigned automatically if your network supports this capability.
Otherwise, you need to ask your network administrator for the appropriate IPv6 settings.
Obtain an IPv6 address automatically
Use the following IPv6 address:
IPv6 address:
Subnet prefix length:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

Figure 7: Internet Protocol Version 6 Properties Window

6. Select **Use the following IP Address** for static IP addressing and fill in the details as shown in Figure 8.
   For TCP/IPv4 you can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39) that is provided by your IT department.

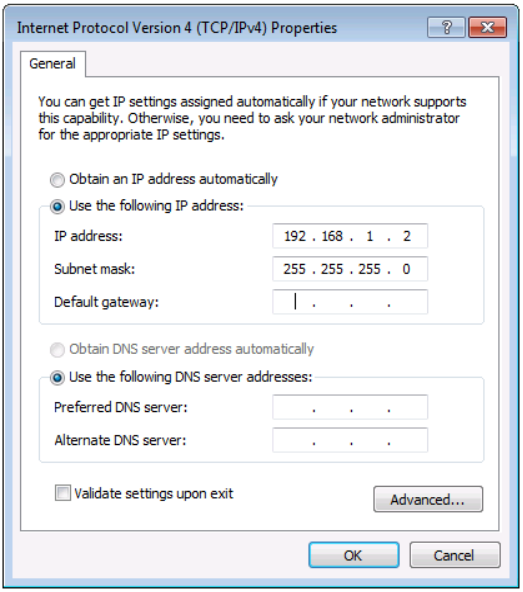

Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 1 . 2
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

Figure 8: Internet Protocol Properties Window

7. Click **OK**.

8. Click **Close**.

7.2.2 Connecting the Ethernet Port via a Network Hub

You can connect the Ethernet port of the **VS-44HN** to the Ethernet port on a network hub or using a straight-through cable with RJ-45 connectors.

7.2.3 Control Configuration via the Ethernet Port

To control several units via the Ethernet, connect the Master unit (Machine # 1) via the Ethernet port to the LAN port of your PC. Use your PC initially to configure the settings (see Section 6.4).

7.3 Upgrading the Firmware

For instructions on upgrading the firmware see "*Upgrading the **VS-44HN** Firmware Using the STC Software*".

8 Technical Specifications

INPUTS:	4 HDMI Connectors
OUTPUTS:	4 HDMI Connectors
BANDWIDTH:	Up to 6.75Gbps data rate (2.25Gbps per graphic channel)
COMPLIANCE WITH HDMI STANDARD:	HDMI and HDCP
RESOLUTION:	Up to UXGA; 1080p
POWER CONSUMPTION:	100–240V AC, 50/60Hz, 25VA
CONTROLS:	Front panel buttons, infrared remote control transmitter, RS-232, Ethernet
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS:	19” x 7.24” x 1U (W, D, H)
WEIGHT:	1.7kg (3.75lbs) approx.
ACCESSORIES:	Power cord, IR transmitter, rack ”ears”
OPTIONS:	External remote IR receiver cable
Specifications are subject to change without notice at http://www.kramerelectronics.com	

9 Default Communication Parameters

RS-232			
Protocol 2000 (Default)		**Protocol 3000**	
Baud Rate	9600	Baud Rate	9600
Data Bits	8	Data Bits	8
Stop Bits	1	Stop Bits	1
Parity	None	Parity	None
Command Format	HEX	Command Format	ASCII
Example (Output 1 to Input 1)	0x01, 0x81, 0x81, 0x81	Example (Output 1 to Input 1)	#VID1>1<CR>

Switching Protocol			
P2000 –> P3000		**P3000 –> P2000**	
Command	0x38, 0x80, 0x83, 0x81	Command	#P2000<CR>
Front Panel	Press and hold Output 1 and Output 3 simultaneously	Front Panel	Press and hold Output 1 and Output 2 simultaneously

Ethernet			
IP Address	192.168.1.39	TCP Port	5000 or 10001 or 50000
Subnet Mask	255.255.255.0	UDP Port	50000

10 Default EDID

Monitor
  Model name..... VS-44HN
  Manufacturer..... KMR
  Plug and Play ID..... KRM0200
  Serial number..... 1
  Manufacture date..... 2010, ISO week 24
  Filter driver..... None

  EDID revision..... 1.3
  Input signal type..... Digital (DVI)
  Color bit depth..... Undefined
  Display type..... RGB color
  Screen size..... 700 x 390 mm (31.5 in)
  Power management..... Not supported
  Extension blocs..... 1 (CEA-EXT)

  DDC/CI..... n/a

Color characteristics
  Default color space..... Non-sRGB
  Display gamma..... 2.20
  Red chromaticity..... Rx 0.640 - Ry 0.341
  Green chromaticity..... Gx 0.286 - Gy 0.610
  Blue chromaticity..... Bx 0.146 - By 0.069
  White point (default).... Wx 0.284 - Wy 0.293
  Additional descriptors... None

Timing characteristics
  Horizontal scan range.... 31-94kHz
  Vertical scan range..... 50-85Hz
  Video bandwidth..... 170MHz
  CVT standard..... Not supported
  GTF standard..... Not supported
  Additional descriptors... None
  Preferred timing..... Yes
  Native/preferred timing.. 1280x720p at 60Hz
    Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 746 +hsync -vsync
  Detailed timing #1..... 1920x1080p at 60Hz (16:9)
    Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync

Standard timings supported
    720 x 400p at 70Hz - IBM VGA
    720 x 400p at 88Hz - IBM XGA2
    640 x 480p at 60Hz - IBM VGA
    640 x 480p at 67Hz - Apple Mac II
    640 x 480p at 72Hz - VESA
    640 x 480p at 75Hz - VESA
    800 x 600p at 56Hz - VESA
    800 x 600p at 60Hz - VESA
    800 x 600p at 72Hz - VESA
    800 x 600p at 75Hz - VESA
    832 x 624p at 75Hz - Apple Mac II
   1024 x 768i at 87Hz - IBM
   1024 x 768p at 60Hz - VESA
   1024 x 768p at 70Hz - VESA
   1024 x 768p at 75Hz - VESA
   1280 x 1024p at 75Hz - VESA
   1152 x 870p at 75Hz - Apple Mac II
   1280 x 720p at 60Hz - VESA STD
   1280 x 800p at 60Hz - VESA STD
   1440 x 900p at 60Hz - VESA STD
   1280 x 960p at 60Hz - VESA STD
   1280 x 1024p at 60Hz - VESA STD
   1400 x 1050p at 60Hz - VESA STD
   1680 x 1050p at 60Hz - VESA STD
   1600 x 1200p at 60Hz - VESA STD

EIA/CEA-861 Information
  Revision number..... 3
  IT underscan..... Not supported
  Basic audio..... Supported
  YCbCr 4:4:4..... Supported
  YCbCr 4:2:2..... Supported
  Native formats..... 1

Detailed timing #1..... 720x480p at 60Hz (4:3)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1920x1080i at 50Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #4..... 1280x720p at 60Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #5..... 1280x720p at 50Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
720 x 576p at 50Hz - EDTV (4:3, 16:15)
1280 x 720p at 50Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
1920 x 1080i at 50Hz - HDTV (16:9, 1:1)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080p at 50Hz - HDTV (16:9, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 3-channel, 24-bits at 44/48 kHz

CE speaker allocation data
Channel configuration.... 7.1
Front left/right..... Yes
Front LFE..... No
Front center..... Yes
Rear left/right..... No
Rear center..... No
Front left/right center.. No
Rear left/right center... No
Rear LFE..... No

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Report information
Date generated..... 08-Jul-12
Software revision..... 2.60.0.972
Data source..... File
Operating system..... 5.1.2600.2.Service Pack 3

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,02,01,00,00,00,18,14,01,03,81,46,27,78,0A,D5,7C,A3,57,49,9C,25,
11,48,4B,FF,FF,80,81,C0,81,00,95,00,81,40,81,80,90,40,B3,00,A9,40,01,1D,00,72,51,D0,1A,20,6E,28,
55,00,7E,88,42,00,00,1A,02,3A,80,18,71,38,2D,40,58,2C,45,00,C4,8E,21,00,00,1E,00,00,00,FC,00,56,
53,2D,34,32,48,4E,0A,20,20,00,00,00,00,00,00,FD,00,32,55,1F,5E,11,00,0A,20,20,20,20,20,20,01,7B,
02,03,1A,71,47,11,13,05,14,84,10,1F,23,0A,06,04,83,05,00,00,65,03,0C,00,10,00,8C,0A,D0,8A,20,E0,
2D,10,10,3E,96,00,58,C2,21,00,00,18,01,1D,80,18,71,1C,16,20,58,2C,25,00,C4,8E,21,00,00,9E,01,1D,
80,D0,72,1C,16,20,10,2C,25,80,C4,8E,21,00,00,9E,01,1D,00,72,51,D0,1E,20,6E,28,55,00,C4,8E,21,00,
00,1E,01,1D,00,BC,52,D0,1E,20,B8,28,55,40,C4,8E,21,00,00,1E,00,00,00,00,00,00,00,00,00,00,00,90

11 Kramer Protocol 2000

The Kramer Protocol 2000 RS-232/RS-485 communication uses four bytes of information as defined below. All the values in the table are decimal, unless otherwise stated.

MSB							LSB
	DESTINATION	**INSTRUCTION**					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0
1st byte							
	INPUT						
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0
2nd byte							
	OUTPUT						
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0
3rd byte							
			MACHINE NUMBER				
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0
4th byte							

1st BYTE: Bit 7 – Defined as 0.
D – "DESTINATION": 0 - for sending information to the switchers (from the PC);
1 - for sending to the PC (from the switcher).
N5…N0 – "INSTRUCTION"
The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5…N0).

2nd BYTE: Bit 7 – Defined as 1.
I6…I0 – "INPUT".
When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.
O6…O0 – "OUTPUT".
When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.
Bit 5 – Don't care.
OVR – Machine number override.
M4…M0 – MACHINE NUMBER.
Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers accept (implement) the command, and the addressed machine replies. For a single machine controlled via the serial port, always set M4…M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Instruction Codes for Protocol 2000				
Instruction		Definition for Specific Instruction		Notes
#	Description	Input	Output	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3, 15
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
56	CHANGE TO ASCII	0	Kramer protocol 3000	19
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller

NOTES on the above table:

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it resets according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it performs the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code

01 85 88 83

was sent from the PC, then the switcher (machine 3) switches input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher sends HEX codes:

41 81 87 83

to the PC.

When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B 80 80 85

would be HEX codes

4B 80 81 85

NOTE 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine sends its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

7D	96	90	81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine sends its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D	83	85	81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

7D	D9	C3	81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E	82	81	82 (ie. request the number of outputs)

would be HEX codes

7E	82	90	82

ie. 16 outputs

NOTE 15 – When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) causes all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it performs any "video" instruction.

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

NOTE 19 - After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

12 Protocol 3000

By default, the **VS-44HN** is set to Protocol 2000 (see Section 11) but is also compatible with Kramer's protocol 3000.

Note that the **VS-44HN** needs to be set to protocol 2000 in order to use the IR remote control.

The **VS-44HN** can be operated using serial commands from a PC, remote controller or touch screen using the Kramer Protocol 3000.

This section describes:

- Kramer Protocol 3000 syntax (see Section 12.1)
- Kramer Protocol 3000 commands (see Section 12.2)

12.1 Kramer Protocol 3000 Syntax

12.1.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	*device_id@*	**Message**	CR

12.1.1.1 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	**Command** SP *Parameter_1,Parameter_2,…*	CR

12.1.1.2 Command String

Formal syntax with commands concatenation and addressing:

Start	Address	Body	Delimiter
#	*device_id@*	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	CR

12.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	*device_id@*	**Message**	CR LF

12.1.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	*device_id@*	**Command** SP [*Param1 ,Param2 …*] **result**	CR LF

CR = Carriage return (ASCII 13 = 0x0D)
LF = Line feed (ASCII 10 = 0x0A)
SP = Space (ASCII 32 = 0x20)

12.1.3 Command Terms

Command

A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command and parameters must be separated by at least one space.

Parameters

A sequence of alphanumeric ASCII characters ('0'-'9','A'-'Z','a'-'z' and some special characters for specific commands). Parameters are separated by commas.

Message string

Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.

Note: A string can contain more than one command. Commands are separated by a pipe ('|') character.

Message starting character

'#' – For host command/query

'~' – For device response

Device ID (Optional, for K-NET)

K-NET Device ID followed by '@'

Query sign

'?' follows some commands to define a query request.

Message closing character

CR – For host messages; carriage return (ASCII 13)

CRLF – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character

When a message string contains more than one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

12.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter **CR** press the Enter key.
(**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

12.1.5 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

12.1.6 Chaining Commands

Multiple commands can be chained in the same string. Each command is delimited by a pipe character (“|”). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

12.1.7 Maximum String Length

64 characters

12.2 Kramer Protocol 3000 Commands

Command	Short Form	Description	Permission
#		Protocol handshaking	End User
BUILD-DATE?		Read device build date	End User
CPEDID		Copy EDID data from the output to the input EEPROM	End User
DISPLAY?		Read if output is valid	End User
FACTORY		Reset to factory default configuration	
GETEDID		Read EDID data	User SW Internal
GETEDID-EXT		Read EDID data from external device connected to output	User SW Internal
HELP		List of commands	End User
IDV		Visual identify device	End User
INFO-IO?		Read in/out count	End User
INFO-PRST?		Read maximum preset count	End User
LOCK-FP	LCK	Lock front panel	Administrator
LOCK-FP?	LCK?	Read Lock front panel	End User
MODEL?		Read device model	End User
P2000		Switch to protocol 2000	End User
PROT-VER?		Read device protocol version	End User
PRST-LST?		Read saved presets list	End User
PRST-RCL		Recall saved preset	End User
PRST-STO		Store current connections to preset	End User
PRST-VID?		Read video connections from saved preset	End User
RESET		Reset device	Administrator
SIGNAL?		Read if input is valid	End User
SN?		Read device serial number	End User
VERSION?		Read device firmware version	End User
VID		Switch Video only	End User
VID?		Get Video switch state	End User

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We welcome your questions, comments, and feedback.

Web site: www.kramerelectronics.com

E-mail: info@kramerel.com

SAFETY WARNING

Disconnect the unit from the power supply before opening and servicing

P/N: 2900-300161 Rev: 8